

WHAT IS CLAIMED IS:

1. A field emission display device, comprising:

first and second substrates provided opposing one another with a
predetermined gap therebetween;

at least one gate electrode formed in a predetermined pattern on the
first substrate;

cathode electrodes formed in a predetermined pattern, the cathode
electrodes including openings that are formed where the cathode electrodes
intersect the gate electrode;

an insulation layer formed between the at least one gate electrode and
the cathode electrodes;

counter electrodes formed in the openings and with predetermined
dimensions such that predetermined gaps are formed between the counter
electrodes and the cathode electrodes;

emitters contacting the cathode electrodes;

at least one anode electrode formed on the second substrate opposing
the first substrate; and

phosphor layers formed in a predetermined pattern on the anode
electrode;

wherein two of the emitters are provided on opposite sides of each of
the counter electrodes, each of the emitters including one long side in proximity
to the corresponding counter electrode and two short sides contacting the
corresponding cathode electrode.

2. The field emission display device of claim 1, wherein the counter
electrodes contact a respective gate electrode through holes formed in the
insulating layer such that the counter electrodes are electrically connected to
the respective gate electrode.

3. The field emission display device of claim 1, wherein each of the

cathode electrodes includes a pair of emitter-receiving sections formed by extending the openings of the cathode electrodes to predetermined dimensions on opposite sides of the counter electrodes.

5 4. The field emission display device of claim 3, wherein the emitters are provided within the emitter-receiving sections and with its short sides contacting the cathode electrodes such that the emitters close an entrance side of the emitter-receiving sections to thereby form spaces between the emitters and the cathode electrodes.

10 5. The field emission display device of claim 3, wherein the emitters include a second long side that is positioned at a predetermined distance from the cathode electrodes.

15 6. The field emission display device of claim 4, wherein lengths of the emitter-receiving sections and emitters in a direction along lengths of the cathode electrodes are substantially identical to a width of the counter electrodes along the same direction.

20 7. The field emission display device of claim 1, wherein the emitters are made of carbon-based material selected from the group consisting of carbon nanotubes, graphite, diamond, diamond-like carbon, C₆₀ (Fullerene), and a mixture of the carbon-based material.

25 8. The field emission display device of claim 3, wherein two or more emitters are separately provided in each of the emitter-receiving sections.

30 9. The field emission display device of claim 3, wherein the cathode electrodes are each divided into a first sub electrode and a second sub electrode, the counter electrodes are positioned between the first and second sub electrodes, and the emitter-receiving sections are formed along edges of the first and second sub electrodes closest to the counter electrode.

10. The field emission display device of claim 1, wherein the emitters are rectangular having long sides and short sides, and dimensions of the short sides are varied to control a contact area with the cathode electrodes.

11. The field emission display device of claim 1, wherein grooves are formed in side walls of the cathode electrodes within the emitter-receiving sections and ends of the emitters are inserted within the grooves to thereby vary a contact area of the emitters with the cathode electrodes.

12. The field emission display device of claim 1, further comprising a mesh grid mounted between the cathode electrodes and the anode electrode.

13. The field emission display device of claim 1, further comprising a metal thin film layer formed on the phosphor layers.

14. The field emission display device of claim 12, further comprising lower spacers mounted in non-pixel regions between the first substrate and the mesh grid, and upper spacers mounted in non-pixel regions between the second substrate and the mesh grid.

15. A field emission display, comprising:
a first substrate;
at least one gate electrode formed in a predetermined gate electrode pattern on the first substrate;
a plurality of cathode electrodes formed in a predetermined cathode electrode pattern;
an insulation layer formed between the at least one gate electrode and the plurality of cathode electrodes
emitters electrically contacting the cathode electrodes;
a second substrate opposing the first substrate with a predetermined gap therebetween, the first substrate and the second substrate forming a

vacuum container;

at least one anode electrode formed in a predetermined anode electrode pattern on a surface of the second substrate opposing the first substrate; and

phosphor layers formed in a predetermined phosphor layer pattern on the at least one anode electrode;

wherein a pixel region is formed between an emitter and a respective phosphor layer of the predetermined phosphor layer pattern at each intersection of:

a cathode electrode and a gate electrode when the anode electrode is a common anode electrode, or

a cathode electrode and an anode electrode when the gate electrode is a common gate electrode;

wherein counter electrodes are formed in openings in the cathode formed at each intersection and with predetermined dimensions such that predetermined gaps are formed between the counter electrodes and the cathode electrodes;

wherein two of the emitters are provided on opposite sides of each of the counter electrodes, each of the emitters including one long side in proximity to the corresponding counter electrode and two short sides contacting the corresponding cathode electrode;

wherein predetermined voltages are applied to the at least one anode electrode, cathode electrodes and the at least one gate electrode generating an electric field between respective gate electrodes and the emitters such that electrons emitted from emitters are induced toward and strike the phosphor layer in a corresponding pixel region to realize predetermined images.

16. The field emission display of claim 15, wherein the at least one gate electrode formed in a predetermined gate electrode pattern is a plurality of gate electrodes formed in a striped pattern and the at least one anode electrode formed in a predetermined anode electrode pattern is one anode electrode functioning as the common electrode.

17. The field emission display of claim 15, wherein the at least one anode electrode formed in a predetermined anode electrode pattern is a plurality of anode electrodes formed in a striped pattern and the at least one gate electrode formed in a predetermined gate electrode pattern is one gate electrode functioning as the common electrode.

18. The field emission display device of claim 9, wherein the emitters are provided within the emitter-receiving sections and with its short sides contacting the cathode electrodes such that the emitters close an entrance side of the emitter-receiving sections to thereby form spaces between the emitters and the cathode electrodes.

19. The field emission display device of claim 9, wherein the emitters include a second long side that is positioned at a predetermined distance from the cathode electrodes.

20. The field emission display device of claim 9, wherein lengths of the emitter-receiving sections and emitters in a direction along lengths of the cathode electrodes are substantially identical to a width of the counter electrodes along the same direction.

21. The field emission display device of claim 9, wherein the emitters are made of carbon-based material selected from the group consisting of carbon nanotubes, graphite, diamond, diamond-like carbon, C₆₀ (Fullerene), and a mixture of the carbon-based material.

22. The field emission display device of claim 9, wherein two or more emitters are separately provided in each of the emitter-receiving sections.

23. The field emission display device of claim 9, wherein the emitters are rectangular having long sides and short sides, and dimensions of the short sides are varied to control a contact area with the cathode electrodes.

24. The field emission display device of claim 9, wherein grooves are formed in side walls of the cathode electrodes within the emitter-receiving sections and ends of the emitters are inserted within the grooves to thereby vary a contact area of the emitters with the cathode electrodes.

25. The field emission display device of claim 9, further comprising a mesh grid mounted between the cathode electrodes and the anode electrode.

26. The field emission display device of claim 9, further comprising a metal thin film layer formed on the phosphor layers.

27. The field emission display device of claim 25, further comprising lower spacers mounted in non-pixel regions between the first substrate and the mesh grid, and upper spacers mounted in non-pixel regions between the second substrate and the mesh grid.